

# EXPOSURE TO FINE AND ULTRAFINE PARTICLES OF REGULAR BIKE USERS COMMUTING THROUGH DIFFERENT ROUTES IN SANTIAGO, CHILE

**Paulina Pino**, *School of Public Health, Faculty of Medicine, University of Chile*

**Pablo Ruiz**, *School of Public Health, Faculty of Medicine, University of Chile*

**Faustino Alonso**, *School of Public Health, Faculty of Medicine, University of Chile*

**Verónica Iglesias**, *School of Public Health, Faculty of Medicine, University of Chile*

**Background and aims:** In Santiago (Chile), high levels of fine (PM<sub>2.5</sub>) and ultrafine particles (UFP) might pose a hazard to cyclists who inhale more air volume than those who commute passively. This could be particularly true in less affluent areas with older vehicular fleet. Our objective was to evaluate the exposure of regular cyclists to fine and ultrafine particles during 30' bike rides in four routes differentiated by affluence of the area and degree of vehicular traffic.

**Methods:** Experimental study with cross-over assignment to 4 routes with different degrees of exposure (high and low vehicular traffic) in two geographic areas socially differentiated in Santiago. 55 healthy bike users of 18-35 y, nonsmokers, were recruited. Informed consent, questionnaire and assignment order to the routes was performed. Measurements were done (n=200) at morning traffic peak hours and participants were brought up directly from their domiciles. On each measurement participants made a ride of 30 minutes along the assigned route. Exposure to PM<sub>2.5</sub> (by DUSTTRAK, TSI INC) and ultrafine particles (by P-TRAK, TSI INC) was measured continuously every 1 second.

**Results:** In affluent areas the means ( $\pm$ SD) for PM<sub>2.5</sub> ( $\mu\text{g}/\text{m}^3$ ) was 29.0 (14.7) vs 47.4 (20.7) in the less affluent ( $p<0.05$ ); for UFP (pt/cc) this figures were 45200 (25200) vs 51900 (19600),  $p>0.05$ . High traffic routes had a mean PM<sub>2.5</sub> of 38.6 (17.5) vs 38.1 (22.3) in the low traffic roads ( $p>0.05$ ) whereas for UFP the means were 56700 (22100) for the high traffic routes vs 39100 (19600) for those roads with low vehicular traffic ( $p<0.05$ ).

**Conclusion:** Differences in PM<sub>2.5</sub> for bike users in Santiago seems likely to be determined by contextual characteristics of wider zones in the city. By the other hand UFP have higher variability related to differences in vehicular traffic emissions forming microenvironments within those wider contextual areas.